UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,860	01/23/2006	Rohini Krishnan	NL03 0910 US1	9709

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EXAMINER
TIMORY, KABIR A

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/565,860	KRISHNAN ET AL.
	Examiner	Art Unit
	KABIR A. TIMORY	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *23 January 2006*.
2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-19* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) *1-19* is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on *23 January 2006* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☒ All   b) ☐ Some * c) ☐ None of:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *1/23/2006*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____ .

DETAILED ACTION

Specification

1.   The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR
        DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A
        COMPACT DISC.

(f) BACKGROUND OF THE INVENTION.
        (1) Field of the Invention.
        (2) Description of Related Art including information disclosed under 37
        CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A
        "Sequence Listing" is required on paper if the application discloses a
        nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if
        the required "Sequence Listing" is not submitted as an electronic
        document on compact disc).

Insert the following headings in the appropriate sections of the specification:

(1) BACKGROUND OF THE INVENTION.
(2) BRIEF SUMMARY OF THE INVENTION.
(3) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

(4) DETAILED DESCRIPTION OF THE INVENTION.

Claim Objections

2.   Claims 1-19 are objected to because of the following informalities:

(1) The claims are objected to because the lines are crowded too closely

together, making reading difficult. Substitute claims with lines one and one-half or

double spaced on good quality paper are required. See 37 CFR 1.52(b).

(2) In claim 1, line 1: Insert **--An--** at the beginning of line.

(3) In claim 1, line 1: replace **"Apparatus"** with **--apparatus--** at the beginning of

the line.

(4) In claim 1, line 3: insert **--n-bit--** between **"said"** and **"digital"**.

(5) In claim 1, line 4: insert **--n-bit digital--** between **"said"** and **"signal"**.

(6) In claims 2-12, line 1: insert **--The--** at the beginning of the line and replace

"Apparatus" with **--apparatus--** at the beginning of the line in all claims (2-12).

(7) In claim 6, line 2: define the acronym **"FPGAs"** in the claim.

(8) In claim 7, line 5: the claim recite a limitation **"some predetermined**

threshold"; the term **"some"** constructs an indefinite statement. This issue can

be resolved by changing "some" to **--a--**.

(9) In claims 8 and 15, line 2: define all the terms of the acronym **"nix"** in the

claim. The claims have defined **"x"** in the claim, however, the term **"n"** and **"i"**

should be defined the claims as well.

(10) In claims 10 and 17, line 2: define the variable **"n"** of the equation.

(11) In claim 13, line 3: insert **--n-bit--** between **"said"** and **"digital"**.

(12) In claim 13, line 3: replace **"the step"** with **--a step--** at the end of the line.

(13) In claim 13, line 4: insert **--n-bit digital--** between **"said"** and **"signal"**.

(14) In claims 14-19, line 1: replace **"A"** with **--The--** at the beginning of the line.

(15) In claim 14, line 2: delete **"the"** between **"comprises"** and **"steps"**.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4.   Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(1) Claim 1 recites the limitation **"the width"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

(2) Claim 2 recites the limitation **"the signal transmitted previously"** in line 3. There is insufficient antecedent basis for this limitation in the claim.

(3) Claim 5 recites the limitation **"the data transmitted"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

(4) Claim 7 recites the limitation **"the values"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

(5) Claim 7 recites the limitation **"the corresponding bits"** in line 4. There is insufficient antecedent basis for this limitation in the claim.

(6) Claim 7 recites the limitation **"the current signal"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

(7) Claim 7 recites the limitation **"the previous signal"** in line 4. There is insufficient antecedent basis for this limitation in the claim.

(8) Claim 13 recites the limitation **"the width"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

(9) Claim 14 recites the limitation **"the current signal"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

(10) Claim 14 recites the limitation **"the values"** in line 3. There is insufficient antecedent basis for this limitation in the claim.

(11) Claim 14 recites the limitation **"the corresponding bits"** in line 4. There is insufficient antecedent basis for this limitation in the claim.

(12) Claim 14 recites the limitation **"the previous signal"** in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

5.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 13-19 are rejected under 35 U.S.C. 101 because the process/method claims (1) must be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials) to a different sate or thing. For example a method claim that would not qualify as a statutory process

would be claim that recited purely mental steps. Thus, to qualify as a § 101 statutory

process, the claim should positively recite the other statutory class (the thing or product)

to which it is tied, for example by identifying the apparatus that accomplishes the

method steps, or positively recite the subject matter that is being transformed, for

example by identifying the material that is being changed to a different state.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.   Claims 1-3 and 7-19 are rejected under 35 U.S.C. 102(b) as being

anticipated by Borkar et al. (US 20020130794).

Regarding claims 1 and 13:

As shown in figures 1-7, Borkar et al. disclose an apparatus for transmitting an n-

bit digital signal **(Bits to be transmitted in block 50 of figure 3)** across an interconnect

(74 in figure 3), where n is the width of said interconnect **(N + X in figure 3, par 0029)**,

the apparatus comprising means for converting said digital signal into its low swing

equivalent **(72 in figure 3, in par 0033, Borkar et al. disclose that driver 72 provides**

low swing signal. According to figure 3, driver 72 receives the transmitted bits

via encoder 68 and then convert is to low swing signal), the apparatus being

characterized by means for encoding **(68 in figure 3)** said signal **(Bits to be**

transmitted in block 50 of figure 3), prior to transmission thereof **(figure 3 shows**

that Bits are encoded prior to be transmitted on interconnect 74) (abstract, par

0017-0019).

Regarding claim 2:

Borkar et al. further disclose wherein the encoding is targeted for low energy

(changing the current bit set on conductor 64 to low by the encoder 68 is

interpreted to be the encoding is targeted for low energy) characterized by reducing

the number of bits which change in a current signal **(current bit set is interpreted to**

be a current signal. See figures 3 and 5) to be transmitted relative to the bits of the

signal transmitted previously **(last bit set is interpreted to be the bits of the signal**

transmitted previously. See figures 3 and 5) (par 0020, lines 1-9).

Regarding claim 3:

Borkar et al. further disclose wherein the encoding is targeted for reducing

crosstalk induced noise **(par 0032, lines 1-4)**.

Regarding claims 7 and 14:

Borkar et al. further disclose wherein the means for encoding **(68 in figures 3**

and 5) said signal comprises means for comparing **(90 in figure 5)** the values of the

current signal **(current bit set in figure 5)** to be transmitted with the values of a signal

transmitted previously **(last bit set in figure 5)**, determining whether or not the number

of bits of said current signal **(current bit set in figure 5)** which are of opposite value to

the corresponding bits of the previous signal **(last bit set in figure 5)** exceeds some

predetermined threshold value, and only encoding said current signal if said

predetermined threshold value is exceeded **(par 0023, lines 1-10, par 0034, lines 13-**

15, claim 9).

Regarding claims 8 and 15:

Borkar et al. further disclose wherein if the width of the interconnect being coded

is even **(par 0019)**, the predetermined threshold value is nix, where x is an even integer

(par 0019).

Regarding claims 9 and 16:

Borkar et al. further disclose wherein x = 2 **(par 0019, lines 11-12)**.

Regarding claims 10 and 17:

Borkar et al. further disclose wherein if the width of the interconnect being

encoded is odd **(figure 4 shows that the width of interconnect is greater or equal to**

one. Therefore the examiner is interpreting that the width of interconnect is odd),

the predetermined threshold value is $[(n + 1)/2] - 1$ **(par 0019)**.

Regarding claims 11 and 18:

Borkar et al. further disclose further including a receiver **(110 in figure 3)**.

Regarding claims 12 and 19:

Apparatus according to claim 11, wherein the type of encoding employed by said

encoding means is bus invert coding, whereby if the number of bits that "flip" exceeds

the predetermined threshold value, all of the bits of the current signal to be transmitted

across the interconnect are inverted prior to transmission thereof, and an "invert" signal

is also transmitted, to indicate to said receiver that said signal has been inverted **(par**

0024, lines 1-5, par 0026, lines, par 0026, lines 10-15).

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.   Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Borkar et al. in view of Victor et al. (Bus encoding to prevent crosstalk delay".

IEEE/ACM International Conference on Computer Aided Design, 2001. Nov. 4-8,

2001 pp. 57-63).

Regarding claim 4:

Borkar et al. disclose all of the subject matter as described above except for

specifically teaching wherein the encoding is targeted for reducing crosstalk induced

delay.

However, Victor et al. in the same field of endeavor teach wherein the encoding

is targeted for reducing crosstalk induced delay **(abstract, page 57, col 1 and 2)**.

Therefore, it would have been obvious to one ordinary skill in the art at the time the

invention was made to use encoding algorithm as taught by Victor et al. to modify the

encoding of Borkar et al. in order to reduce crosstalk and delay in the system.

10.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Borkar et al. in view of Stonecypher et al. (US 20040109509).

Regarding claim 5:

Borkar et al. disclose all of the subject matter as described above except for specifically teaching wherein the encoding is targeted for increasing robustness of the data transmitted.

However, Stonecypher et al. in the same field of endeavor teach wherein the encoding is targeted for increasing robustness of the data transmitted **(par 0110)**. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use encoding algorithm as taught by Stonecypher et al. to modify the encoding of Borkar et al. in order to robustness of the multilevel signaling.

11.   Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Borkar et al. in view of Victor et al. and Stonecypher et al. as applied to claim 1 and further in view of Schaik et al. (US 20050068987).

Regarding claim 6:

Borkar et al. disclose all of the subject matter as described above except for specifically teaching apparatus according to claim 1, being used in respect of programmable logic devices, specifically FPGAs (embedded or stand-alone), to reduce

energy increase robustness by improving signal integrity, reducing crosstalk, and/or reduce delay.

However, Victor et al. in the same field of endeavor teach reducing crosstalk, and/or reduce delay **(abstract, page 57, col 1 and 2)**. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use encoding algorithm as taught by Victor et al. to modify the encoding of Borkar et al. in order to reduce crosstalk and delay in the system.

Borkar et al. and Victor et al. disclose all of the subject matter as described above except for specifically teaching apparatus according to claim 1 being used in respect of programmable logic devices, specifically FPGAs (embedded or stand-alone), to reduce energy increase robustness by improving signal integrity, reducing crosstalk, and/or reduce delay.

However, Stonecypher et al. in the same field of endeavor teach to reduce energy increase robustness by improving signal integrity **(par 0110)**. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use encoding algorithm as taught by Stonecypher et al. to modify the encoding of Borkar et al. in order to robustness of the multilevel signaling.

Borkar et al. , Victor et al., and Stonecypher et al. disclose all of the subject matter as described above except for specifically teaching apparatus according to claim 1 being used in respect of programmable logic devices, specifically FPGAs (embedded or stand-alone).

However, Schaik et al. in the same field of endeavor teach apparatus according to claim 1 being used in respect of programmable logic devices, specifically FPGAs (embedded or stand-alone) **(par 0007-0008 and par 0051)**. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use FPGA technology as taught by Schaik et al. to modify the encoding of Borkar et al. in order to maximize the speed and reliability of the data channel (see par 0051).

Conclusion

12.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to KABIR A. TIMORY whose telephone number is (571)270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kabir A Timory/
Examiner, Art Unit 2611
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